

CLAIMS

1/ A method of extracting, by evaporation, solid residue in suspension and/or in solution in fluid matter containing
5 volatile substances, in particular aqueous matter, the method comprising:

a) applying the matter to be treated in the form of a thin layer on the smooth and hot face of a heat exchange wall which is heated to a temperature that is high enough
10 to cause the water and/or other volatile substances contained in the matter to evaporate quickly, said hot wall moving cyclically around a closed path;

b) crushing the layer of matter against said hot face to level it and to encourage crumbling and spreading
15 thereof; and

c) at the end of a cycle, recovering the solid and dry residue that has formed on said hot face by scraping it off;

the method being characterized by the fact that
20 immediately before applying the material, it is caused to expand greatly in volume so as to give it the consistency of a foam, such that it is the foam which is applied in the form of a thin layer on the hot face.

2/ A method according to claim 1, characterized by the fact that the volume is expanded by a factor lying in the range 20 to 100.

3/ A method according to claim 1, characterized by the fact that particles that remain adhering to said hot face after the scraping operation are eliminated in order to prevent them reaching the zone in which the foam is applied.

4/ A method according to claim 1, characterized by the fact that the treated matter is farm-yard manure, in particular pig manure.

5/ A machine for extracting solid residue to be found in suspension and/or in solution in fluid matter containing volatile substances, and in particular aqueous matter, the machine comprising:

- 5 a) a heat exchange wall having a smooth and hot face which is heated to a temperature that is high enough to cause the water and/or the other volatile substances contained in the matter to evaporate quickly, said wall being movable cyclically around a closed path;
- 10 b) feeder and applicator means for feeding and applying the matter to be treated onto said hot face at the beginning of the cycle in the form of a thin layer;
- c) crushing means suitable for encouraging crumbling and spreading of the layer of matter on said hot face; and
- 15 d) scraper means operative at the end of the cycle to recover the solid residue that has formed;
- the machine being characterized by the fact that said feeder and applicator means are adapted to cause the matter to expand greatly in volume and to give it the consistency
- 20 of a foam immediately before it is applied, and to deposit said foam on the hot face in the form of a thin layer.

6/ A machine according to claim 5, in which said hot face is plane and horizontal, the machine being characterized by the fact that the means for expanding the volume of the matter comprise both a box placed over said hot face, the

5 box being downwardly open and open on one side in the forward direction of advance of the moving wall, and feeder means for feeding the matter to be treated into the box, said box defining a chamber in which the matter expands, the bottom of the chamber being constituted by said moving

10 hot face.

7/ A machine according to claim 6, characterized by the fact that the matter is fed into the box by means of a positive displacement pump via an Archimedes' screw constituted by a brush mounted to rotate in a feed duct.

8/ A machine according to claim 6, characterized by the fact that the box has a top wall whose bottom face is plane and horizontal and parallel to the hot face, said top wall being movable in a vertical direction so as to be capable
5 of being lowered and pressed against said hot face in order to clean it.

9/ A machine according to claim 27, characterized by the fact that it includes means to cause said pump to stop momentarily, and simultaneously to cause the top wall of the box to be lowered and pressed against the hot face, and
5 to do so in cyclical manner, with said top wall being raised thereafter automatically by resilient return members.

10/ A machine according to claim 6, characterized by the fact that the outline of said box when seen from above is flared, with its opening being directed in the forward direction of advance of the moving wall, and matter being
5 fed to the upstream portion of the box, in its narrow zone.

11/ A machine according to claim 5, characterized by the fact that said crushing means comprise at least one flexible sheet which is pressed against the matter by resilient means such as a spring blade.

12/ A machine according to claim 11, characterized by the fact that said flexible sheet is driven with reciprocating motion of small amplitude.

13/ A machine according to claim 11, characterized by the fact that said flexible sheet is made of polytetrafluoroethylene.

14/ A machine according to claim 5, characterized by the fact that said scraper means comprises a battery of scrapers working in cascade, driven with cyclical motion following substantially elliptical paths.

15/ A machine according to claim 5, in which said heat exchange wall is a rotary disk having a vertical axis with the top face of the disk constituting said hot face, the machine being characterized by the fact that said scrapers
5 are arranged to transfer the residue progressively towards the outside of the disk and to cause it to drop into a vertical collector well.

16/ A machine according to claim 15, characterized by the fact that it includes an additional scraper suitable for scraping the outside edge of the disk.

17/ A machine according to claim 15, characterized by the fact that it includes a fixed circularly arcuate side panel disposed beside the disk immediately downstream from the means for applying the matter on the disk and serving to
5 prevent the foam from escaping outwards.

18/ A machine according to claim 5, characterized by the fact that it includes means for mechanically removing particles that remain stuck to said hot face, said means being situated downstream from said scraper and recovery
5 means and upstream from the applicator means.

19/ A machine according to claim 18, characterized by the fact that said means for removing the particles comprise a pick-up metal sheet associated with at least one removal wormscrew.

20/ A machine according to claim 28, the machine being characterized by the fact that said particle removal means are adapted to evacuate said particles towards the outside of the disk.

21/ A machine according to claim 15, comprising a set of identical horizontal disks that are closely spaced apart on the same vertical axis, which disks rotate together about their axis, the machine being characterized by the fact
5 that it includes a heated annular collector track disposed at the bottom of the machine, vertically beneath the edges of the disk.

22/ A machine according to claim 21, characterized by the fact that it has a set of scrapers turning synchronously with the set of disks in the collector track and adapted to transfer particles that are to be found therein towards an
5 evacuation hole situated at the collector well.

23/ A machine according to claim 21, characterized by the fact that it has scrapers adapted to scrap off deposit adhering to the bottom faces of the disks so that said deposit drops onto the top faces of the underlying disks
5 and/or into the collector track.

24/ A machine according to claim 21, in which all of the disks are hollow and are carried by a tubular shaft whose inside space communicates with the inside space of each disk, said spaces constituting a condensation chamber, said
5 set of disks being mounted inside an evaporation chamber, the machine having a system for extracting the vapor produced in the evaporation chamber, for mechanically compressing said vapor, and for introducing the compressed vapor into the condensation chamber.

25/ A machine according to claim 5, characterized by the fact that it includes a device for extracting and compacting all of the residue, e.g. a pair of hot moving endless belts.

26/ A machine according to claim 5, characterized by the fact that it includes means for washing said hot face in hot water.

27/ (new) A machine according to claim 7, characterized by the fact that the box has a top wall whose bottom face is plane and horizontal and parallel to the hot face, said top wall being movable in a vertical direction so as to be
5 capable of being lowered and pressed against said hot face in order to clean it.

28/ (new) A machine according to claim 5, in which said heat exchange wall is a rotary disk having a vertical axis with the top face of the disk constituting said hot face, the machine being characterized by the fact that said
5 scrapers are arranged to transfer the residue progressively towards the outside of the disk and to cause it to drop into a vertical collector well and further including means for mechanically removing particles that remain stuck to said hot face, said means being situated downstream from
10 said scraper and recovery means and upstream from the applicator means.